

Pharmacogenomics- Not a Concept for the Future, it is a REALITY NOW!

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Pharmacogenomics combine pharmacology and genetics to provide information on how our unique and individual genetic make-up influences our responses to medications. The science has been in progress for more than 50 years; however, clinical and practical use was limited until lately. More healthcare professionals are now using pharmacogenomics to guide them in better prescribing. This has changed the traditional “one size fits to all” method of prescribing to one that is personalized, both from a response to medication as well as to avoid drug related side effects perspective.

The science of pharmacogenomics is complex. When a drug is administered in the body, it is absorbed, distributed, then metabolized to produce active or inactive metabolites and finally eliminated from the body. Genetic variations in the genes involved in the absorption, distribution, metabolism and excretion (ADME) of pharmaceuticals influence drug safety and efficacy and are the foundation of pharmacogenomics. For example- some of us may be “good metabolizers” of certain drugs, and others may be “poor metabolizers”. These labels translate to how long the drug may be in our system, and how toxic. But knowing the ADME of drugs which is known as ‘*pharmacokinetics*’ is still not enough to explain an individual’s response to drugs. It is also important to understand how the drug affects the body after it binds to the target site- the ‘*pharmacodynamics*’. Pharmacogenomics, therefore, explains both pharmacokinetics and pharmacodynamics of drugs and their interactions with multiple genes.

Unlike other traditional pharmacogenetic testing organizations, Personalized Prescribing Inc., offers pharmacogenomic tests that encompasses the *kinetics* and *dynamic* aspects of the science. This comprehensive test provides more relevant information to help physicians select the right dose and the right drug, when first prescribed.

Since everyone possesses a unique genetic make-up, the interpretation of the test results is paramount. Simply providing a color-coded digital report falls far short of getting the real value from the test. Personalized Prescribing takes the broader approach of including a pharmacist-guided summary report together with the digital report. It involves a review of the patient’s medical history and corresponding research. This approach was found to be very effective for patients. It empowers them to discuss the recommendation with their physicians, and together making informed decisions for a path to recovery. The following case studies speak for themselves.

Case Studies

Case Study #1

Medical Condition: *A Rheumatoid Arthritis (RA) patient was suffering from severe chronic pain. In 2016, the patient developed lower leg and foot fractures. The patient who was a physician exclaimed: “I wish I can cut my leg off!”.*

Medication Issue: The patient was prescribed Methotrexate with folic acid supplements since 2005. These medications are routinely prescribed to RA patients. The patient was also taking medications for thyroid problem, and an analgesic drug for chronic pain and a stomach protectant.

Pharmacogenomic Test Results: The test result indicated that the patient has a rare genetic variation, which caused the patient to have problems in converting folic acid to its active form. Research suggests that the variation is likely to lead to enhanced chronic pain (i.e. chronic bone inflammation and increased fracture risk) when taking regular folic acid supplements.

Recommendations and Supporting Rationales: The patient was recommended to take a drug that contained the active form of folic acid that would alleviate the chronic pain. In addition, the patient was suggested to take Calcium, Vitamin D and B12 supplementation as the stomach protectant could deplete the calcium and B12 levels and that could further reduce the bone density.

Patient Feedback and results: A month later, we followed up and the patient sent the following feedback. "I'm feeling great! I made the recommended changes and am now almost completely healed. Finally! I am spreading the word to my colleagues who think it's a great idea for those with chronic disorders. Thank you for touching base." - Patient (Physician)

Case Study #2

Medical Condition: A bipolar employee, on short-term disability, was admitted to hospital due to manic attack. The employee had a history of a severe manic episodes.

Medication Issue: The employee was taking Seroquel (Quetiapine) which is an antipsychotic drug in addition to lithium and Temazepam. The employee was also regularly taking recreational cannabis.

Pharmacogenomic Test Results: The test result showed that the employee has genetic variations that make the employee to be at high risk of acquiring movement disorders (i.e. tardive dyskinesia, parkinsonism, and akathisia) as a side effect of antipsychotic drugs. The employee is also an intermediate metabolizer of Escitalopram, Citalopram, Sertraline and certain Tricyclic Antidepressants.

Recommendations and Supporting Rationales: The employee was recommended to avoid antipsychotics that have a high intrinsic risk of causing movement disorders and evade a list of medications that have extrapyramidal side-effects. Recommendations were made to continue lithium and Quetiapine as the employee has been stable on this medication combination. Quetiapine also has low risk of causing movement disorders.

In addition, the employee was recommended to reduce/ avoid the use of recreational cannabis. Research suggests that the previous manic episodes and hospitalization may have been triggered by cannabis usage.

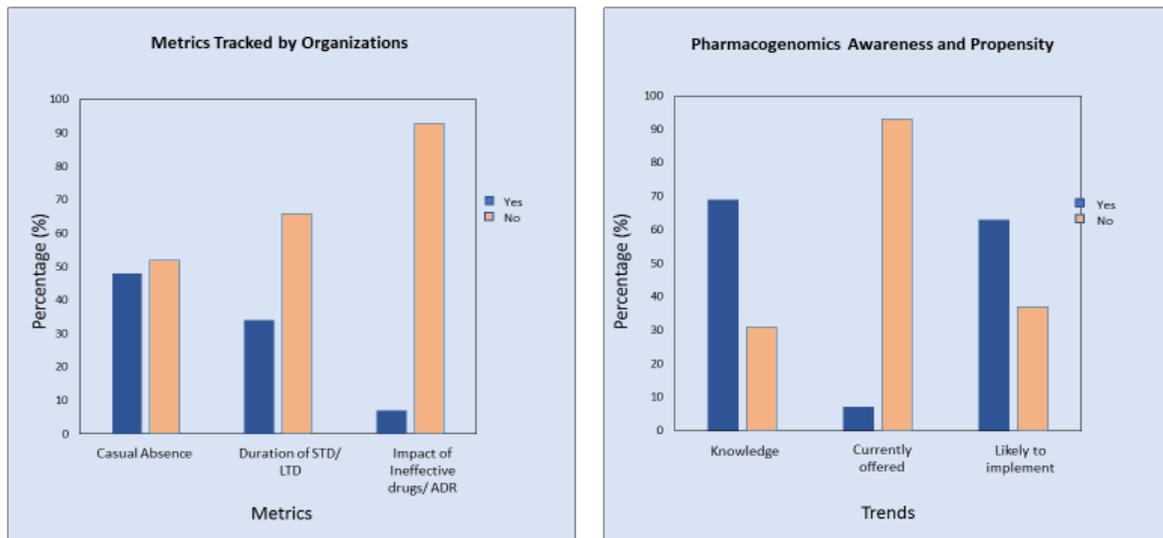
Patient Feedback and results: The employee agreed to reduce the cannabis intake and joined the work in next few days. The disability manager who referred the employee sent the feedback by saying, "It's amazing the things you find out with this....".

Industry Attitudes are Changing....

Given the advancements in technology and science, organizations and individuals are better appreciating the positive aspects of Pharmacogenomic tests from a business perspective, and for personal health

improvement. A recent industry flash survey conducted by Personalized Prescribing on opinions from HR leaders and benefit consultants about pharmacogenomic test is further proof of the growing interest. The survey evaluated the current industry practice of recording employee absences and disability from medication related issues. It also examined the appetite to use pharmacogenomic test for addressing absenteeism and long/short term disability of the employees.

Industry Opinion Survey Report



The survey revealed-

- 48% of the organization measure casual absence of the employees but 66% do not record average duration period lost due to short/ long term disability and 93% do not measure if adverse drug effects or ineffective drugs were causing employees to stay away from work.
- 69% of the organizations are aware that genetic make-up can affect individual's response to drugs, however, only 7% offer a drug evaluation plan that leads to pharmacogenomic test.
- **63% of the organization would like to consider in implementing drug evaluation plan with pharmacogenomic test.**

The survey results are promising! A similar survey conducted in 2015 with Human Resource Professional Association (HRPA) showed that only 32% of the organization would think of implementing pharmacogenetic tests as part of their benefit plan. This shift reinforces that pharmacogenomics is no longer just a concept of future medicine, it is a reality. It is an effective medical practice to outline the precision-based treatments that can essentially improve the lives of millions of people. Moreover, it is an excellent tool for employers/ disability managers to



address employee's drug related disability or absenteeism. For more information, please contact us: sanjida@personalizedprescribing.com/ info@personalizedprescribing.com